WHAT IS CLAIMED IS:

1. A method of treating electrically conductive waste contaminated with nuclear fuel materials from a nuclear fuel handling facility, which comprises:

a molten salt electrolysis process for removing the nuclear fuel materials adhering to a surface of the waste by immersing the waste in a molten salt to dissolve a surface layer of the waste electrochemically in the molten salt; and

a filtering process for filtering the molten salt used in the molten salt electrolysis process to extract the nuclear fuel materials removed from the surface of the waste and accumulated in the molten salt from the molten salt;

wherein the molten salt filtered in the filtering process is reused in the molten salt electrolysis process.

2. The method according to claim 1 further comprising an evaporation process for removing the molten salt adhering to a surface of the waste processed by the molten salt electrolysis process and taken out of the molten salt by heating the waste so that the molten salt adhering thereto evaporates;

wherein the molten salt recovered in the evaporation process is reused in the molten salt electrolysis process.

3. The method according to claim 1 further comprising:

a cleaning process for removing the molten salt adhering to the waste processed by the molten salt electrolysis process and taken out of the molten salt by a cleaning liquid; and

an evaporative drying process for drying the molten salt contained in the cleaning liquid by evaporating the cleaning liquid used in the cleaning process;

wherein the molten salt recovered in the evaporative drying process is reused in the molten salt electrolysis process, and the cleaning liquid evaporated in the evaporative drying process is reused in the cleaning process.

4. The method according to claim 1, wherein the molten salt and the waste immersed in the molten salt are moved relative to each other in the molten salt electrolysis process to remove the nuclear fuel materials from the surface of the waste.

5. The method according to claim 4, wherein, in the molten

salt electrolysis process, the waste is contained in a basket serving as an electrode for an electrolysis and the basket is vibrated in the molten salt.

6. The method according to claim 4, wherein, in the molten salt electrolysis process, the waste is contained in a basket serving as an electrode for an electrolysis and the basket is rotated in the molten salt.

7. The method according to claim 4, wherein, in the molten salt electrolysis process, the molten salt is spouted against the waste immersed in the molten salt.

8. The method according to claim 1, wherein, a liquid metal, which is in a liquid phase at a temperature high enough to maintain the molten salt in a molten state, is placed in the molten salt as an electrode for the molten salt electrolysis process.

9. The method according to claim 1 further comprising a reducing process for reducing the nuclear fuel materials to metals before subjecting the waste to the molten salt electrolysis process when the nuclear fuel materials are oxides.

10. The method according to claim 9, wherein, in the reducing process, the nuclear fuel materials are reduced to metals by making the nuclear fuel materials react with a reducing agent.

11. The method according to claim 10, wherein the reducing process comprises:

immersing the waste contaminated with the nuclear fuel materials in a reducing molten salt;

supplying a reducing agent into the reducing molten salt; and

applying a voltage that will not cause a decomposition of the reducing molten salt across an anode and a cathode immersed in the reducing molten salt to regenerate the reducing agent reacted with the nuclear fuel materials.

12. The method according to claim 9, wherein the reducing process comprises:

immersing the waste contaminated with the nuclear fuel oxides in a reducing molten salt; and

reducing the nuclear fuel materials to metals by applying a voltage across an anode and a cathode immersed in the reducing

molten salt for an electrolytic reduction.

13. A method of treating an electrically conductive waste contaminated with nuclear fuel materials from a nuclear fuel handling facility, which comprises:

a reducing process for reducing the nuclear fuel materials to metals;

a thermal melting process for producing a molten salt by heating and melting the metals produced by reducing the nuclear fuel materials and the waste; and

a molten salt electrolysis process for recovering the metals produced by reducing the nuclear fuel materials and contained in the molten salt by applying a voltage across an anode and a cathode immersed in the molten salt so that the metals produced by reducing the nuclear fuel materials are deposited on the cathode.

14. The method according to claim 13, wherein a chloride or a hydride having a same kind of cation as that of the molten salt is added to the molten salt to lower the melting point of the molten salt so that an operating temperature of the molten salt in the molten salt electrolysis process is lowered.

15. The method according to claim 13 further comprising:

a cleaning process for separating the nuclear fuel materials from the waste by cleaning the nuclear fuel materials deposited on the cathode in the molten salt electrolysis process and the waste with a cleaning liquid to dissolve the waste in the cleaning liquid; and

an oxidation process for converting the nuclear fuel materials separated from the waste by the cleaning process into oxides by oxidizing the nuclear fuel materials;

wherein the waste is an adsorbent used in the nuclear fuel material handling facility.

16. The method according to claim 15 further comprising an evaporative drying process for drying the adsorbent contained in the cleaning liquid by evaporating the cleaning liquid used in the cleaning process; wherein the cleaning liquid evaporated by the evaporative drying process is reused in the cleaning process.

17. An apparatus for treating an electrically conductive waste contaminated with nuclear fuel materials from a nuclear fuel handling facility, which comprises:

a molten salt electrolysis unit for removing the nuclear fuel materials adhering to a surface of the waste by immersing the waste in a molten salt to dissolve a surface layer of the waste electrochemically in the molten salt;

a filtering unit for filtering the molten salt used by the molten salt electrolysis unit to extract the nuclear fuel materials removed from the surface of the waste and accumulated in the molten salt from the molten salt; and

a molten salt return line for returning the molten salt filtered by the filtering unit to the molten salt electrolysis unit.

18. The apparatus according to claim 17 further comprising:

an evaporation unit for removing the molten salt adhering to a surface of the waste by heating the waste processed by the molten salt electrolysis unit and taken out of the molten salt so that the molten salt adhering thereto evaporates; and

a molten salt return line for returning the molten salt removed from the surface of the waste by the evaporation unit to the molten salt electrolysis unit.

19. The apparatus according to claim 17 further comprising:

a cleaning unit for removing the molten salt adhering to the waste processed by the molten salt electrolysis unit and taken out of the molten salt by a cleaning liquid;

an evaporative drying unit for drying the molten salt contained in the cleaning liquid by evaporating the cleaning liquid used by the cleaning unit;

a molten salt return line for returning the molten salt recovered by the evaporative drying unit to the molten salt electrolysis unit; and

a cleaning liquid return line for returning the cleaning liquid evaporated by the evaporative drying unit to the cleaning unit.

20. The apparatus according to claim 17, wherein the molten salt electrolysis unit is provided with a driving mechanism for moving the molten salt and the waste immersed in the molten salt relative to each other.

21. The apparatus according to claim 20, wherein the molten salt electrolysis unit is provided further with a basket capable of containing the waste and serving as an electrode for an electrolysis, and the driving mechanism vibrates the basket in the molten salt.

22. The apparatus according to claim 20, wherein the molten salt electrolysis unit is provided further with a basket capable of containing the waste and serving as an electrode for an electrolysis, and the driving mechanism rotates the basket in the molten salt.

23. The apparatus according to claim 20, wherein the driving mechanism includes a spouting means for spouting the molten salt against the waste immersed in the molten salt.

24. The apparatus according to claim 17, wherein the molten salt electrolysis unit is provided with an electrode formed from a liquid metal, which is immersed in the molten salt and is in a liquid phase at a temperature high enough to maintain the molten salt in a molten state.

25. The apparatus according to claim 17 further comprising a reducing unit for reducing the nuclear fuel materials to metals when the nuclear fuel materials are oxides.

26. An apparatus for treating an electrically conductive waste contaminated with nuclear fuel materials from a nuclear fuel handling facility, which comprises:

a reducing unit for reducing the nuclear fuel materials to metals;

a thermal melting unit for producing a molten salt by heating and melting the metals produced by reducing the nuclear fuel materials and the waste; and

a molten salt electrolysis unit for recovering the metals produced by reducing the nuclear fuel materials and contained in the molten salt by applying a voltage across an anode and a cathode immersed in the molten salt so that the metals produced

by reducing the nuclear fuel materials are deposited on the cathode.

27. The apparatus according to claim 26 further comprising:

a cleaning unit for separating the nuclear fuel materials from the waste by cleaning the nuclear fuel materials deposited on the cathode of the molten salt electrolysis unit and the waste with a cleaning liquid to dissolve the waste in the cleaning liquid; and

an oxidizing unit for converting the nuclear fuel materials separated from the waste by the cleaning unit into oxides by oxidizing the nuclear fuel materials;

wherein the waste is an adsorbent used in the nuclear fuel material handling facility.

28. The apparatus according to claim 27 further comprising:

an evaporative drying unit for drying the adsorbent contained in the cleaning liquid by evaporating the cleaning liquid used by the cleaning unit; and

a cleaning liquid return line for returning the cleaning liquid recovered by the evaporative drying unit to the cleaning unit.